

CLAIMS

1. (Original) A reflecting device having electrically controllable, variable reflection, comprising:

a composition comprising a periodic array of liquid crystal disposed in a polymer matrix, the liquid crystal having an index of refraction that is variable in response to an applied electric field, wherein the index of refraction of the liquid crystal array and the index of refraction of the polymer matrix,  $n_p$  are mismatched at said first and second applied electric field strength; and

a pair of electrodes positioned to apply an electric field across the composition and capable of applying the first and second applied electric field strength.

2. (Original) The reflecting device of claim 1, wherein the first applied electric field strength is zero.

3. (Original) The reflective device of claim 1 or 2, wherein the second applied electric field strength is sufficient to substantially align the liquid crystal droplets.

4. (Original) The reflective device of claim 1, wherein the device possesses at least two reflection wavelengths, each reflection wavelength associated with a different applied field strength.

5. (Original) The reflective device of claim 1, wherein the liquid crystal has an ordinary index refraction  $n_o$ , and an extraordinary index of refraction,  $n_e$ , and the polymer has a refractive index,  $n_p$ , and where  $n_o \neq n_p$ .
6. (Original) The reflective device of claim 1, wherein the liquid crystal has an ordinary index of refraction  $n_o$ , and an extraordinary index of refraction,  $n_e$ , and the polymer has a refractive index,  $n_p$ , and  $n_e > n_p > n_o$ .
7. (Original) The reflective device of claim 1, wherein the liquid crystal has a positive dielectric anisotropy.
8. (Original) The reflective device of claim 1, wherein the liquid crystal has a negative dielectric anisotropy.
9. (Original) The reflective device of claim 1, wherein the liquid crystal has a dielectric anisotropy dependant upon applied field frequency.
10. (Original) The reflecting device of claim 1, wherein the device is selected from the group consisting of waveguide gratings, switchable lenses, switchable filters, optical add-drop multiplexers and attenuators.

11. (Original) The reflecting device of claim 1, further comprising:  
a power source in electrical communication with the electrodes for generating the electric field.
12. (Original) The reflective device of claim 1, wherein the electrode comprises a conductive layer in electrical communication with the composition.
13. (Original) The reflective device of claim 12, wherein the conductive layer comprises indium titanium oxide (ITO).
14. (Original) The reflective device in claim 1, wherein the electrode comprises a metallic electrode.
32. (Original) A reflecting device having electrically controllable, variable reflection comprising:  
a periodic array of liquid crystal disposed in a polymer matrix, the liquid crystal having an index of refraction variable in response to an applied electric field;  
and  
means for applying an electric field across the device to provide first and second applied electric field strengths,

wherein index of refraction of the liquid crystal and the index of refraction of the polymer matrix,  $n_p$ , are mismatched at said first and second applied electric field strengths.